International Standards for Spacecraft Ground Systems and Operations

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Primary Sources for International Standards

- ISO (International Organization for Standardization
  - TC20/SC14 Space Systems & Operations
    - Secretariat: AIAA
    - US TAG Administrator: AIAA
  - TC20/SC13 Space Data & Information Transfer Systems
    - Secretariat: NASA Headquarters
    - US TAG Administrator: AIAA
- CCSDS (Consultative Committee for Space Data Systems)

Benefits of International Standards for Space Systems

- Reduce cost of routine activities*
- Refocus resources toward the purpose of the system*
- Generic interface standards supporting data management, archiving, and presentation to users*
- Consistent practices for design, analysis, and test of ground operations products and systems

*Courtesy of Adrian Hooke, Jet Propulsion Laboratory

TC20/SC14 Work Program

- 30 standards published; 64 more in process
- 18 participating and observing countries
- Program Management (14300, 2 parts)
- Electromagnetic Compatibility (14302)
- Safety Requirements (14620, 3 parts)
- Ground Support Equipment (14625)
- Unmanned Mission Operations Concepts (14711)
- Flight to Ground Umbilicals (15389)
- Risk Management (17666)

TC20/SC14 Work Program

- Ground Operations Standards in Preparation
  - EEE Parts (14621, 2 parts)
  - Pressure Vessels (14623)
  - Unmanned Spacecraft Operability (14950)
  - Surface Cleanliness of Fluid Systems (14952, 6 parts)
  - Space Solar Cells (15387)
  - Unmanned Spacecraft General Test Methods (15864)
  - Unmanned Spacecraft Transportation (16458)
  - Oxygen Safety (22538, 4 parts)

TC20/SC13 Work Program

- 28 standards published, 19 more in preparation
- 16 participating and observing countries
- Time Code Format (11104)
- Telemetry Channel Coding (11754)
- Time Code Command Operations Procedure (12174)
- Standard Formatted Data Units (12175, 4 parts)
- Packet Telemetry (13419)
- Open Archival Information System Reference Model (14721)
- Protocol Specification (15891, 4 parts)

TC20/SC13 Work Program

- Space Data Standards in Preparation
  - Telemetry Space Data Link Protocol (3 parts)
  - Space Packet Protocol
  - Communications Operations
  - Space Link Extension (3 parts)

CCSDS Program & Benefits

- 34 organizations (10 participating, 24 observing)
- Panel Structure
  - 1 Space Communications
  - 2 Space Information Interchange Processes
  - 3 Cross Support Operations
- Most panels meet twice per year
- Most projects become ISO standards through SC13
- Joint effort with SC14 on Spacecraft On-board Interfaces
- 200 mission flown with CCSDS protocols
- 100 CCSDS-compliant products

ISO Software Standards Applicable to Space Systems

- ISO/IEC 12207:1995 Information technology —Software life cycle processes
- ISO/IEC 15288:2002 System engineering — System life cycle processes
- ISO/IEC TR15846:1998 Information technology — Software life cycle processes — Configuration management